STAR Trigger Level 0 Configurations– Run 2005

Last update: 26th April 2005

TCU Input Bit Lists

Bit	Set 1 – Minimum Bias & Central Research l1_ld301_ctb_zdc.rbt	Set 2 – Primary Data Taking l1_ld301_emc_jpsi.rbt	Set 3 – Proton-Proton Auxiliary Data Taking l1_ld301_pp.rbt	Set 4 – Proton-Proton (Longitudinal) Data Taking l1_ld301_pplong_2005.rbt
0	CTB Multiplicity > th0	CTB Multiplicity-1	CTB Multiplicity > th0	J/Ψ
1	CTB Multiplicity > th1	CTB Multiplicity-2	(BBC East$_{small}$ ADC> th) AND (BBC West$_{small}$ ADC> th)	(BBC East$_{small}$ ADC> th) AND (BBC West$_{small}$ ADC> th)
2	CTB Multiplicity > th2	BBC TAC diff in window	BBC TAC diff in window	BBC TAC diff in window
3	BBC TAC diff in window	ZDC TAC diff in window	(ZDC East ADC > th and East TAC in window) OR (ZDC West ADC > th and West TAC in window)	FPD East > th1 OR FPD West > th1
4	ZDC TAC diff in window	(BBC East$_{small}$ ADC> th) AND (BBC West$_{small}$ ADC> th)	FPD East > th OR FPD West > th	FPD East > th0 OR FPD West > th0
5	BBC East$_{small}$ ADC> th	(ZDC East ADC > th0) AND (ZDC West ADC > th0)	BEMC/EEMC adjacent jet patch trigger	BEMC/EEMC adjacent jet patch trigger
6	BBC West$_{small}$ ADC> th	(ZDC East TAC in window) AND (ZDC West TAC in window)	BEMC Hi-Tower: 1	BEMC Hi-Tower: 1
7	ZDC East ADC > th0	UPC_EMC	BEMC Hi-Tower: 2	BEMC Hi-Tower: 2
8	ZDC West ADC > th0	Zero Bias bit	BEMC Jet Patch: 1	BEMC Jet Patch: 1
9	ZDC East TAC in window	Blue + Yellow bunches filled	BEMC Jet Patch: 2	BEMC Jet Patch: 2
10	ZDC West TAC in window	BEMC Hi-Tower-1	EEMC Hi-Tower: 1	EEMC Hi-Tower: 1
11	ZDC E+W attenuated ADC sum > th	BEMC Hi-Tower-2	EEMC Hi-Tower: 2	EEMC Hi-Tower: 2
12	Zero Bias bit	EEMC Hi-Tower-1	EEMC Jet Patch: 2	EEMC Jet Patch: 1
13	Blue bunch filled	EEMC Hi-Tower-2	J/Ψ	EEMC Jet Patch: 2
14	Yellow bunch filled	FPD East > th0 OR FPD West > th0	Blue + Yellow bunches filled	Blue + Yellow bunches filled
15	Special Trigger Flag (Off)	Special Trigger Flag (Off)	Zero Bias bit	Zero Bias bit

Bit	Set 5 – Proton-Proton FPD Data Taking l1_ld301_fpd_2005.rbt	Pedestal NOTE: same as Set 1 l1_ld301_ctb_zdc.rbt
0	J/Ψ	CTB Multiplicity > th0
1	(BBC East$_{small}$ ADC> th) AND (BBC West$_{small}$ ADC> th)	CTB Multiplicity > th1
2	BBC TAC diff in window	CTB Multiplicity > th2
3	FPD Fast: th1 singles OR th0 coincidence OR E.W th2 coincidence	BBC TAC diff in window
4	FPD Slow: th2 singles OR th0 coincidence OR E.W th2 coincidence	ZDC TAC diff in window
5	BEMC/EEMC adjacent jet patch trigger	BBC East$_{small}$ ADC> th
6	BEMC Hi-Tower: 1	BBC West$_{small}$ ADC> th
7	BEMC Hi-Tower: 2	ZDC East ADC > th0
8	BEMC Jet Patch: 1	ZDC West ADC > th0
9	BEMC Jet Patch: 2	ZDC East TAC in window
10	EEMC Hi-Tower: 1	ZDC West TAC in window
11	EEMC Hi-Tower: 2	ZDC E+W attenuated ADC sum > th
12	EEMC Jet Patch: 1	Zero Bias bit
13	EEMC Jet Patch: 2	Blue bunch filled
14	Blue + Yellow bunches filled	Yellow bunch filled
15	Zero Bias bit	Special Trigger Flag (Off)

NOTES:

- The 2 bits, CTB Multiplicity-1 and CTB Multiplicity-2, encode a number between 0 and 3 indicating which of 3 thresholds were exceeded.
- The 2 bits, Hi-Tower-1 and Hi-Tower-2, encode a number between 0 and 3 indicating which of 3 thresholds were exceeded.
- The 2 bits, Jet Patch-1 and Jet Patch-2, encode a number between 0 and 3 indicating which of 3 thresholds were exceeded.
- The UPC_EMC bit is calculated based on the "back-to-back" bit from the BEMC in combination with cuts on the CTB multiplicity and vetos from the large-tile BBC and the ZDC (th1)
- The J/Ψ bit is set if a pair of jet patches in opposite halves of the BEMC have high towers above a user-selected threshold.
- The adjacent jet patch bit is set if two adjacent jet patches in either the BEMC or the EEMC have energies over a user-selected threshold.
- The Zero Bias bit is set every Nth bunch crossing, where N is defined from registers in the Run Control GUI
- The Random Bit has an average rate that is also controlled from registers in the Run Control GUI
- The Special Requests are common to the first two sets and absent from the rest. If the Special Trigger Flag is ON then the TCU input bits have the following definitions:

Bit	Special Requests
0	Req. bit 0
1	Req. bit 1
2	Req. bit 2
3	Detector ID bit 0
4	Detector ID bit 1
5	Detector ID bit 2
6	Detector ID bit 3
7	Random Bit
8	
9	
10	
11	
12	
13	
14	
15	Special Trigger Flag (On)

Tier1 Files

041026

BBC	Good ADC values are summed and the sums are compared to thresholds for East and West separately.
	The fastest good TAC is found for East and West separately, and their difference is calculated.
	"Killer Bits" are used in the ADC sum logic.
ZDC	ADC values are compared to thresholds.
	A window is put on each TAC value, and in parallel the TAC difference is calculated
	"Killer Bits" are used in the ADC-threshold and TAC-window logic
	The SMD data is just recorded
CTB	The ADC values are all summed.
	The UPC-topology logic runs in parallel
BEMC/EEMC	Jet patch energy sums and high towers are compared to 3 thresholds.
	The results are combined for the Barrel and Endcap separately.
	J/Ψ detection logic is based on the West half of the barrel only.
	The back-to-back detection logic is not implemented
	The adjacent jet patch logic can use the Barrel, Endcap or both.
FPE/FPW	High-tower algorithms are now in use: 3 thresholds are applied to each ADC.
	The results are combined for East and West separately.
L1	Set 1 - Minimum Bias and Central Research (see TCU Input Bits List above)

041202

BBC	Same as 041026
ZDC	Same as 041026
CTB	Same as 041026
BEMC/EEMC	East half of barrel has been zeroed out at layer 2, otherwise same as 041026
FPE/FPW	Same as 041026
L1	Set 2 – Primary Data Taking (see TCU Input Bits List above)
	NOTE: This is a dummy version of Set 2. The UPC_EMC bit is non-functional

050111

BBC	Same as 041026
ZDC	Same as 041026
CTB	Same as 041026
BEMC/EEMC	J/Ψ detection logic uses East and West halves of the barrel, but not the endcap
	Back-to-back logic is implemented and also uses both East and West halves of the barrel
	East half of barrel is still zeroed out at layer 2.
FPE/FPW	Changed from High-Tower to Sum algorithms
L1	Set 2 – Primary Data Taking (see TCU Input Bits List above)

050114

BBC	Same as 041026
ZDC	Same as 041026
CTB	Same as 041026
BEMC/EEMC	6 o'clock and 8 o'clock patches in the East half of barrel are still zeroed out at layer 2. All other patches are used. Algorithms same as 050111
FPE/FPW	Same as 050111
L1	Set 4 – Proton-Proton (Longitudinal) Data Taking (see TCU Input Bits List above)

050328

BBC	Same as 041026
ZDC	Same as 041026
CTB	Same as 041026
BEMC/EEMC	Final EMC DSM (EM201) now sends bits to scaler system on second output cable. Everything else is the same as 050114
FPE/FPW	Same as 050111
L1	Set 3 – Proton-Proton Auxilliary Data Taking (see TCU Input Bits List above)

050415

BBC	Same as 041026
ZDC	Same as 041026
CTB	Same as 041026
BEMC/EEMC	Same as 050328
FPE/FPW	Final FPD DSM (FP201) now generates coincidence (AND) bits as well as single hit (OR) bits. All the output bits are masked using a bit from register 3
L1	Set 5 – Proton-Proton FPD Data Taking (see TCU Input Bits List above)

050426

BBC	LUTs at input to final VTX DSM (VT201) are changed from 1-to-1 maps to files that are read in.
ZDC	This allows the user to re-map the TAC difference bits to a range useful for the scalers.
CTB	Same as 041026
BEMC/EEMC	Same as 050328
FPE/FPW	Same as 050415
L1	Set 5 – Proton-Proton FPD Data Taking (see TCU Input Bits List above)